CONTINUATION OF CONCISE EXPLANATION OF INVENTION

U.S. SERIAL NO. 09/220,970

In accordance with MPEP §1206, the claims on appeal have been read on specification and drawings as follows:

51. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method for recognizing a pattern in information comprising data, the method comprising:

inputting data;

(Fig. 2, "Data", described at page 8, line 20)

encoding data as parameters of a plurality of Fourier components in Fourier space;

(Fig. 2, processor (22), described at page 8 lines 21-22)

adding at least two of said Fourier components together to form at least one Fourier series in Fourier space;

(Fig. 2 described at page 13 lines 4-6)

sampling at least one of said Fourier series in Fourier space with a filter to form a sampled Fourier series;

(Fig. 2, filter 34, described at page 13 lines 7-10)

modulating said sampled Fourier series in Fourier space with said filter to form a modulated Fourier series;

(Fig. 2, filter 34, described at page 13 lines 7-10)

determining a spectral similarity between said modulated Fourier series and another Fourier series;

(Fig. 2, spectral similarity analyzer 36, described at page 13 lines 10-15)

determining a probability expectation value based on said spectral similarity;

(Fig. 2, probability expectation analyzer 38, described at page 13 lines 14-17)

generating a probability operand based on said probability expectation value;

(Fig. 2, probability operand generator 40, described at page 13 lines 17-20)

selecting a desired value for said probability operand, wherein recognition of a pattern in said information is obtained when said probability operand having said desired value; and

(Fig. 2, described on page 13, lines 20-26, in this disclosed example, the desired probability operand value was selected to be one, but can be any value desired by the user)

outputting a recognized pattern.

(Fig. 2, described on page 13, lines 20-26, when the desired probability operand value is a desired value, a pattern is recognized and can be outputted as recognized. In the particular disclosed example on page 13, the recognized pattern is outputted in a manner such that the Fourier series is combined with said another Fourier series to a provide string of recognized information represented by the Fourier series (which is recited in dependent claim 52). The recognized string can be increased in size as desired by repeating the steps of the method. Recognition is also referred to as "association" or "associated information" in the application.)

52. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, further comprising adding said modulated Fourier series and said another Fourier series to form a string of Fourier series in Fourier space when said probability operand has said desired value.

53. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 52, further comprising storing said string of Fourier series to a memory.

54. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, wherein said another Fourier series represents known information.

55. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, wherein said steps of adding said plurality of Fourier components together, sampling at least one of said plurality of Fourier series in Fourier space, modulating said sampled Fourier series in Fourier space, determining a spectral similarity between said modulated Fourier series and another one of said plurality of Fourier series, determining a probability expectation value, and generating a probability operand are repeated until a said probability operand has said desired value.

56. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, wherein said value of said probability operand is selected from a set of zero and one; and wherein said desired value is one.

57. *(page 7, lines 14-16; page 10, line 34 to page 11, line 3; page 10, line 34 to page 12, line 2)* A method according to claim 51, wherein said step of encoding data further comprises modulating at least one of said Fourier components to provide an input context.

58. *(page 6, line 25 to page 7, line 10)* A method according to claim 57, wherein inputted information comprises said data and an input context, said input context mapping on a one to one basis to a physical context, said physical context being a relationship between physical characteristics represented by said inputted information.

59. *(page 8, lines 19-29)* A method according to claim 51, wherein each Fourier component of said at least one Fourier series comprises a quantized amplitude, a frequency, or a phase angle.

60. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, wherein said step of adding at least two Fourier components together is conducted to provide at least two Fourier series.

61. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, wherein said data is representative of physical characteristics and said Fourier series in Fourier space is selected from one of:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho 0}}N_{m_{z0}}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_m}}\right)\frac{N_{m_{\rho 0}}\rho_{0_m}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_m}}\right)\frac{N_{m_{z0}}z_{0_m}}{2}\right)$$

and

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}\frac{4}{\rho_{0_m}z_{0_m}}a_{0_m}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_m}}\right)\frac{N_{m_{\rho 0}}\rho_{0_m}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_m}}\right)\frac{N_{m_{z0}}z_{0_m}}{2}\right)$$

wherein a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho 0}}$, $N_{m_{z0}}$, ρ_{0_m}, and z_{0_m} are data parameters.

62. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 61, wherein each of $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ is proportional to a rate of change of said physical characteristics, and each of ρ_{0_m} and z_{0_m} is inversely proportional to an amplitude of said physical characteristics.

63. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 61, wherein each of $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ is proportional to said amplitude of said physical characteristics, and each of ρ_{0_m} and z_{0_m} is inversely proportional to said rate of change of said physical characteristics.

64. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 61, wherein each of $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ is proportional to a duration of a

signal response of at least one input transducer; and each of ρ_{0_m} and z_{0_m} is inversely proportional to said physical characteristics.

65. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 57, wherein step of encoding said data further comprises encoding said input context as a characteristic time delay which corresponds to a characteristic modulation of said Fourier components or Fourier series at a frequency within a band.

66. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 65, wherein said characteristic modulation frequency band represents said input context according to at least one of a transducer, specific transducer element, and fundamental relationships including a physical context, a temporal order, a cause and effect relationship including a temporal order, a size order, an intensity order, a before-and-after order, a top-and-bottom order, and a left-and-right order.

67. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 66, wherein said transducer has *n* levels of subcomponents, and is assigned a master time interval with n+1 sub time intervals in a hierarchical manner corresponding to said *n* levels of the transducer subcomponents, and wherein a data stream from a n^{th} level subcomponent of said transducer is recorded as a function of time in the n+1 sub time intervals, each of said n+1 time intervals representing a time delay that corresponds to said characteristic modulation frequency band representing said input context.

68. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 67, wherein the input context is based on the identity of the specific transducer and transducer subcomponents.

69. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 65, wherein the characteristic modulation having a frequency within the band in Fourier space is represented by $e^{-j2\pi f t_0}$ which corresponds to the time delay $\delta(t-t_0)$ wherein f is the frequency variable, t is the time variable, and t_0 is the time delay.

70. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 69, wherein the step of adding at least two Fourier components together further comprises storing the characteristic modulation frequency in a distinct memory location within the band encoded as a delay in time.

71. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 69, wherein the Fourier series in Fourier space, has a characteristic modulation having a frequency within the band represented by $e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}$ and is selected from one of:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}} a_{0_m} N_{m_{\rho 0}} N_{m_{z0}} e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho 0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho 0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z0}}}{2}\right)$$

and

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}} a_{0_m}\frac{4}{\rho_{0_m} z_{0_m}} e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho 0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho 0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z0}}}{2}\right)$$

wherein $\rho_{t_m}=v_{t_m}t_{t_m}$ is the modulation factor which corresponds to the physical time delay t_{t_m}, $\rho_{fb_m}=v_{fb_m}t_{fb_m}$ is the modulation factor which corresponds to the specific transducer time delay t_{fb_m}, v_{t_m} and v_{fb_m} are constants such as the signal propagation velocities, a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho 0}}$, $N_{m_{z0}}$, ρ_{0_m}, and z_{0_m} are data parameters.

72. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 71, wherein each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

73. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 71, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

74. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 71, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

75. *(page 16, line 16 to page 21, line 8)* A method according to claim 69, wherein the string has a characteristic modulation having a frequency within the band represented by $e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}$ is selected from one of:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho_0}}N_{s,m_{z_0}}e^{-jk_\rho\left(\rho_{fb_{s,m}}+\rho_{t_{s,m}}\right)}$$

$$\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z_0}}z_{0_{s,m}}}{2}\right)$$

and

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}\frac{4}{\rho_{0_{s,m}}z_{0_{s,m}}}e^{-jk_\rho\left(\rho_{fb_{s,m}}+\rho_{t_{s,m}}\right)}$$

$$\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z_0}}z_{0_{s,m}}}{2}\right)$$

wherein $\rho_{t_{s,m}}=v_{t_{s,m}}t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fb_{s,m}}=v_{fb_{s,m}}t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{t_{s,m}}$ and $v_{fb_{s,m}}$ are constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho_0}}$, $N_{s,m_{z_0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters.

76. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 75, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

77. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 75, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

78. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 75, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

79. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 69, wherein the Fourier series in Fourier space, has a characteristic modulation having a frequency within the band represented by $e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}$ and is selected from one of:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho_0}}N_{m_{z_0}}e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho_0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho_0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z_0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z_0}}}{2}\right)$$

and

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}\frac{4}{\rho_{0_m}z_{0_m}}e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho_0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho_0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z_0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z_0}}}{2}\right)$$

wherein $\rho_{t_m}=v_{t_m}t_{t_m}$ is the modulation factor which corresponds to the physical time delay t_{t_m}, $\rho_{fb_m}=v_{fb_m}t_{fb_m}$ is the modulation factor which corresponds to the specific transducer time delay t_{fb_m}, v_{t_m} and v_{fb_m} are constants such as the signal propagation

velocities, a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho_0}}$, $N_{m_{z_0}}$, ρ_{0_m}, and z_{0_m} are data parameters.

80. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 79, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

81. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 79, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

82. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 79, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

83. *(page 16, line 16 to page 21, line 8)* A method according to claim 79, wherein each Fourier series of the string is multiplied by the Fourier transform of the delayed Gaussian filter represented by $e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}(v_{sz0}k_z)}$ wherein the filter established the association to form the string, wherein the string is represented by:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}} a_{0_{s,m}} N_{s,m_{\rho_0}} N_{s,m_{z_0}} e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}(v_{sz0}k_z)}$$

$$e^{-jk_\rho\left(\rho_{fb_{s,m}}+\rho_{I_{s,m}}\right)}\sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z - n\frac{2\pi}{v_{s,m}t_{0_{s,m}}}\right)\frac{N_{s,m_{z_0}}z_{0_{s,m}}}{2}\right)$$

wherein v_{sp0} and v_{sz0} are constants such as the signal propagation velocities in the ρ and z directions, respectively, $\frac{\sqrt{N_{sp0}}}{\alpha_{sp0}}$ and $\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}$ are delay parameters and α_{sp0} and α_{sz0} are half-width parameters of a corresponding Gaussian filter in the ρ and z directions, respectively, $\rho_{t_{s,m}} = v_{t_{s,m}} t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fb_{s,m}} = v_{fb_{s,m}} t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{t_{s,m}}$ and $v_{fb_{s,m}}$ are constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho 0}}$, $N_{s,m_{z0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters.

84. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 83, wherein each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

85. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 83, wherein each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

86. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 83, wherein each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

87. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, wherein the step of adding at least two of said Fourier components together further comprises creating transducer strings by obtaining a Fourier series from at least two selected transducers and adding the Fourier series.

88. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 87, further comprises selecting transducers that are active simultaneously.

89. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 88, wherein the transducer string is stored in a distinct memory location wherein a characteristic modulation having a frequency within the band in Fourier space is represented by $e^{-j2\pi f t_0}$ which corresponds to the time delay $\delta(t - t_0)$ wherein f is the frequency variable, t is the time variable, and t_0 is the time delay.

90. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 89, wherein the step of adding at least two of said Fourier components together further comprises recalling any part of the transducer string from the distinct memory location which thereby causes additional Fourier series of the transducer string to be recalled.

91. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, wherein the filter is a time delayed Gaussian filter in the time domain.

92. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 91, wherein the Gaussian filter comprises a plurality of cascaded stages each stage having a decaying exponential system function between stages.

93. *(page 64, lines 33-36)* A method according to claim 92, wherein the Gaussian filter is modulated in the time domain to produce a frequency shift of the sampling and modulation in the frequency domain.

94. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 91, wherein the filter is characterized in time by:

$$\frac{\alpha}{\sqrt{2\pi}} e^{-\frac{\left(t-\frac{\sqrt{N}}{\alpha}\right)^2}{\frac{2}{\alpha^2}}}$$

wherein $\frac{\sqrt{N}}{\alpha}$ is a delay parameter, α is a half-width parameter, and t is the time parameter.

95. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 94, wherein the filter, in frequency space, is characterized by:

$$e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

wherein $\frac{\sqrt{N}}{\alpha}$ and α are a corresponding delay parameter and a half-width parameter in time, respectively, and f is the frequency parameter.

96. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, wherein the probability expectation value is based upon Poissonian probability.

97. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 96, wherein the probability expectation value is characterized by

$$\prod_s\left[p_{\uparrow_s}+\left(P-p_{\uparrow_s}\right)\exp\left[-\beta_s^2\left(\frac{1-\cos 2\phi_s}{2}\right)\right]\cos\left(\delta_s+2\sin\phi_s\right)\right]$$

wherein P is the maximum probability of at least one other Fourier series being associated with a first Fourier series, $p_{\uparrow_s}$ is a probability of at least one other Fourier series being associated with a first Fourier series in the absence of coupling of the first Fourier series with the at least one other Fourier series, β_s^2 is a number that represents the amplitude of spectral similarity between at least two filtered or unfiltered Fourier series, ϕ_s represents the frequency difference angle between at least two filtered or unfiltered Fourier series, and δ_s, is a phase factor.

98. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 97, wherein β_s^2 is characterized by

$$\beta_s^2=(8\pi)^2\frac{1}{\sqrt{2\pi}}\sqrt{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}}$$

$$\sum_{m_1=1}^{M_1} a_{0_{m_1}} N_{m_1} \sum_{m_s=1}^{M_s} a_{0_{m_s}} N_{m_s} \exp-\left\{\frac{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}\left(\frac{\sqrt{N_1}}{\alpha_1}-\frac{\sqrt{N_s}}{\alpha_s}+\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}}-\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}}\right)^2}{2}\right\}$$

$\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first

and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

99. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 98, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

100. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 98, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

101. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 98, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

102. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 97, wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1} \frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} - \sum_{m_s=1}^{M_s} \frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}}\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1} \frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}}}$$

$\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

103. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 102, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

104. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 102, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

105. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 102, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

106. *(page 16, line 16 to page 21, line 8)* A method according to claim 97, wherein β_s^2 is characterized by

$$\beta_s^2 = (8\pi)^2 \frac{1}{\sqrt{2\pi}} \sqrt{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}} \sum_{m_1=1}^{M_1} a_{0_{m_1}} N_{m_1} \sum_{m_s=1}^{M_s} a_{0_{m_s}} N_{m_s} \cdot \exp - \left\{ \frac{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right) - \left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} + \frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)^2}{2} \right\}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are

constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$, $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

107. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 106, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

108. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 106, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

109. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 106, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

110. *(page 16, line 16 to page 21, line 8)* A method according to claim 97, wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m1}}}{2v_{m_1}} + \frac{\rho_{fbm_1}}{v_{fbm_1}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right) - \sum_{m_s=1}^{M_s}\left(\frac{N_{m_s}\rho_{0_{ms}}}{2v_{m_s}} + \frac{\rho_{fbm_s}}{v_{fbm_s}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m1}}}{2v_{m_1}} + \frac{\rho_{fbm_1}}{v_{fbm_1}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right)}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fbm_1} = v_{fbm_1} t_{fbm_1}$ and $\rho_{fbm_s} = v_{fbm_s} t_{fbm_s}$ are the modulation factors which corresponds to the specific transducer time delay t_{fbm_1} and t_{fbm_s}, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, v_{fbm_1}, and v_{fbm_s} are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1, and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

111. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 110, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

112. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 110, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

113. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 110, wherein each of the data parameters $N_{m_{\rho_0}}$ and

$N_{m_{t_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic. --

114. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 51, further comprising linking at least two Fourier series stored in a memory comprising the steps of

a.) generating a probability expectation value that recalling any part of one of the Fourier series from the memory causes at least another Fourier series to be recalled from the memory;

b.) storing the probability expectation value to memory;

c.) generating a probability operand based on the probability expectation value, and

d.) recalling the at least another Fourier series from the memory if the operand has a desired value.

115. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 114, wherein said probability operand is a value selected from a set of zero and one value selected from a set of zero and one.

116. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 115, wherein said desired value is one.

117. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 114, whereby the probability expectation value increases with a rate of recalling any part of any of the Fourier series.

118. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method for recognizing a pattern in information, the method comprising:

inputting information;

(Fig. 2, "Data", described at page 8, line 20)

representing the information as a plurality of Fourier series in Fourier space;

(Fig. 2, processor (22), described at page 8 lines 21-22)

forming associations between at least two of the Fourier series by modulating and sampling the Fourier series with filters and by coupling the filtered Fourier series based on a probability distribution, wherein when at least two of the Fourier series have been associated recognition of a pattern in the information is achieved; and

(Fig. 2, described on page 13, lines 5-26)

outputting a recognized pattern in the information.

(Fig. 2, described on page 13, lines 20-26, when the desired probability operand value is a desired value, a pattern is recognized and can be outputted as recognized. In the particular disclosed example on page 13, the recognized pattern is outputted in a manner such that the Fourier series containing the recognized pattern is combined with said another Fourier series to a provide string of recognized information represented by the Fourier series (which is recited in dependent claim 120). The recognized string can be increased in size as desired by repeating the steps of the method.)

119. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 118, wherein coupling is based on spectral similarity of said Fourier series.

120. *(page 8, line 19 to page 16, line 15; page 16, line 16 to page 21, line 8)* A method according to claim 118, further comprising adding the associated Fourier series to form a string, and ordering the string.

121. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 118, wherein the filter is a time delayed Gaussian filter in the time domain.

122. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 118, wherein the probability distribution is Poissonian.

123. *(page 16, line 16 to page 21, line 8)* A method according to claim 120, wherein the string is selected from one of:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho 0}}N_{s,m_{z0}}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

and

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}\frac{4}{\rho_{0_{s,m}}z_{0_{s,m}}}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

wherein $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho 0}}$, $N_{s,m_{z0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters.

124. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 123, wherein each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

125. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 123, wherein each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

126. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 123, wherein each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

127. *(page 16, line 16 to page 21, line 8, Fig. 4)* A method for recognizing a pattern in information and establishing an order formatted pattern in information with respect to standard ordered information, the method comprising:

a.) obtaining a string comprising a sum of Fourier series from a memory, said string representing information;

(string memory section 44)

b.) selecting at least two filters from a selected set of filters;

(two filters 48 and 50 from a set of filters 52)

c.) sampling the string with the filters such that each of the filters produces a sampled Fourier series, each Fourier series comprising a subset of the string;

d.) modulating each of the sampled Fourier series in Fourier space with the corresponding selected filter such that each filter produces an order formatted Fourier series;

e.) adding the order formatted Fourier series produced by each filter to form a summed Fourier series in Fourier space;

f.) obtaining an ordered Fourier series from the memory;

(high level memory section 54)

g.) determining a spectral similarity between the summed Fourier series and the ordered Fourier series;

(spectral similarity analyzer 56)

h.) determining a probability expectation value based on the spectral similarity;

(probability expectation value analyzer 58)

i.) generating a probability operand based on the probability expectation value;

(probability operand generator 60)

j.) repeating steps b-i until the probability operand has a desired value, when the probability operand has a desired value a pattern in information has been recognized and an order formatted pattern in the information has been established;

(Processor 42 determines the value of the probability operand. The desired value in the disclosed example on pages 16-18 is one, but can be any value as desired by the user. When the probability operand determined by processor 42 is equal to the desired value a pattern has been recognized.)

k.) storing the summed Fourier series to an intermediate memory;

(intermediate memory section 62)

l.) removing the selected filters from the selected set of filters to form an updated set of filters;

(set of filters 52)

m.) removing the subsets from the string to obtain an updated string;

n.) selecting an updated filter from the updated set of filters;

(selecting updated filter 62 from set of filters 52)

o.) sampling the updated string with the updated filter to form a sampled Fourier series comprising a subset of the string;

p.) modulating the sampled Fourier series in Fourier space with the corresponding selected updated filter to form an updated order formatted Fourier series;

q.) recalling the summed Fourier series from the intermediate memory;

(intermediate memory section 62)

r.) adding the updated order formatted Fourier series to the summed Fourier series from the intermediate memory to form an updated summed Fourier series in Fourier space;

s.) obtaining an updated ordered Fourier series from the high level memory;

(high level memory section 54)

t.) determining a spectral similarity between the updated summed Fourier series and the updated ordered Fourier series;

u.) determining a probability expectation value based on the spectral similarity;

v.) generating a probability operand based on the probability expectation value;

w.) repeating steps n-v until the probability operand has a desired value or all of the updated filters have been selected from the updated set of filters, when the probability operand has a desired value a pattern in information has been recognized an order formatted pattern in the information has been established;

(processor 42)

x.) if all of the updated filters have been selected before the probability operand has a desired value, then clearing the intermediate memory and returning to step b;

y.) if the probability operand has a desired value, then storing the updated summed Fourier series to the intermediate memory;

z.) repeating steps l-y until one of the following set of conditions is satisfied: the updated set of filters is empty, or the remaining subsets of the string of step m.) is nil; and

(processor 42)

aa.) storing the Fourier series in the intermediate memory in the high level memory.

(high level memory section 54)

128. *(page 2, lines 15-25)* A method according to claim 127, wherein information is represented by a sum of Fourier series in Fourier space.

129. *(page 16, line 16 to page 21, line 8; page 7, lines 14-16; page 10, line 34 to page 11, line 3; page 10, line 34 to page 12, line 2)* A method according to claim 127, further comprising encoding data which includes modulating at least one of said Fourier components to provide an input context.

130. *(page 6, line 25 to page 7, line 10)* A method according to claim 127, wherein inputted information comprises data and an input context, said input context mapping on a one to one basis to a physical context, said physical context being a relationship between physical characteristics represented by said inputted information.

131. *(page 8, lines 19-29)* A method according to claim 127, wherein each Fourier component of said at least one Fourier series comprises a quantized amplitude, a frequency, or a phase angle.

132. *(page 16, line 16 to page 21, line 8)* A method according to claim 127, wherein said probability operands having a value selected from a set of zero and one.

133. *(page 16, line 16 to page 21, line 8)* A method according to claim 132, wherein said desired values are one.

134. *(page 12, lines 25-34; page 16, line 16 to page 21, line 8)* A method according to claim 127, wherein the high level memory is initialized with standard inputs.

135. *(page 16, line 16 to page 21, line 8)* A method according to claim 127, wherein the ordering is according to one of temporal order, cause and effect relationships, size order, intensity order, before-after order, top-bottom order, or left-right order.

136. (*page 16, line 16 to page 21, line 8)* A method according to claim 127, wherein each filter of the set of filters is a time delayed Gaussian filter having a half-width parameter α which determines the amount of the string that is sampled.

137. (*page 16, line 16 to page 21, line 8)* A method according to claim 127, wherein each filter of the set of filters is a time delayed Gaussian filter having a delay parameter $\frac{\sqrt{N}}{\alpha}$ which corresponds to a time point.

138. (*page 16, line 16 to page 21, line 8)* A method according to claim 137, wherein each Fourier series of the string is multiplied by the Fourier transform of the delayed Gaussian filter represented by $e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}(v_{sz0}k_z)}$ wherein the filter established the correct order to form the string, wherein the ordered string is represented by:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}} a_{0_{s,m}} N_{s,m_{\rho 0}} N_{s,m_{z0}} e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}(v_{sz0}k_z)}$$

$$e^{-jk_\rho\left(\rho_{fbs,m}+\rho_{t_{s,m}}\right)} \sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right) \sin\left(\left(k_z - n\frac{2\pi}{v_{s,m}t_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

wherein $v_{s\rho 0}$ and v_{sz0} are constants such as the signal propagation velocities in the ρ and z directions, respectively, $\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}$ and $\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}$ are delay parameters and $\alpha_{s\rho 0}$ and α_{sz0} are half-width parameters of a corresponding Gaussian filter in the ρ and z directions, respectively, $\rho_{t_{s,m}} = v_{t_{s,m}} t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fbs,m} = v_{fbs,m} t_{fbs,m}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fbs,m}$, $v_{t_{s,m}}$ and $v_{fbs,m}$ are constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho 0}}$, $N_{s,m_{z0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters.

139. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 138, wherein each of the data parameters $N_{m_{\rho 0}}$ and $N_{m_{z0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each

Fourier component is inversely proportional to the amplitude of the physical characteristic.

140. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 138, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

141. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 138, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

142. *(page 101, lines 15-18; page 16, line 16 to page 21, line 8)* A method according to claim 138, wherein $v_{s,m}t_{0_{s,m}} = \rho_{0_{s,m}}$ and $k_\rho = k_z$ such that the string in Fourier space is one dimensional in terms of k_ρ and is represented by

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty} a_{0_{s,m}} N_{s,m_{\rho_0}} e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{-jk_\rho \rho_{fb_{s,m}}} \sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)$$

wherein $v_{s\rho 0}$ is a constant such as the signal propagation velocity in the ρ direction, $\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}$ is a delay parameter and $\alpha_{s\rho 0}$ is a half-width parameter of a corresponding Gaussian filter in the k_ρ-space, $\rho_{fb_{s,m}} = v_{fb_{s,m}} t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{fb_{s,m}}$ is a constant such as the signal propagation velocity, $a_{0_{s,m}}$ is a constant, k_ρ is the frequency variable, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho_0}}$ and $\rho_{0_{s,m}}$ are data parameters.

143. *(page 101, lines 15-18; page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 142, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m}

and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

144. *(page 101, lines 15-18; page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 142, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

145. *(page 101, lines 15-18; page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 142, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

146. *(page 16, line 16 to page 21, line 8)* A method according to claim 127, wherein the probability expectation value is based upon Poissonian probability.

147. *(page 16, line 16 to page 21, line 8)* A method according to claim 146, wherein the probability expectation value is characterized by

$$\prod_s \left[p_{\uparrow_s} + \left(P - p_{\uparrow_s}\right) \exp\left[-\beta_s^{2}\left(\frac{1-\cos 2\phi_s}{2}\right)\right] \cos\left(\delta_s + 2\sin\phi_s\right)\right]$$

wherein P is the maximum probability that at least one other Fourier series is active given that a first Fourier series is active, $p_{\uparrow_s}$ is a probability of a Fourier series becoming active in the absence of coupling from at least one other active Fourier series, β_s^2 is a number that represents the amplitude of spectral similarity between at least two filtered or unfiltered Fourier series, ϕ_s represents the frequency difference angle between at least two filtered or unfiltered Fourier series, and δ_s, is a phase factor.

148. *(page 16, line 16 to page 21, line 8)* A method according to claim 147, wherein β_s^2 is characterized by

$$\beta_s^2 = (8\pi)^2 \frac{1}{\sqrt{2\pi}} \sqrt{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}} \sum_{m_1=1}^{M_1} a_{0_{m_1}} N_{m_1} \sum_{m_s=1}^{M_s} a_{0_{m_s}} N_{m_s}$$

$$\exp - \left\{ \frac{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right) - \left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} + \frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)^2}{2} \right\}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$, $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data.

149. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 148, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

150. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 148, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

151. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 148, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

152. *(page 16, line 16 to page 21, line 8)* A method according to claim 148, wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right) - \sum_{m_s=1}^{M_s}\left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} + \frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right)}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1, and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

153. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 152, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

154. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 152, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

155. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 152, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

156. *(page 7, lines 11-33, and page 23, lines 8-21, the italicized numbers refer to Fig. 1)* A system *(10)* for recognizing a pattern in information comprising data and establishing an order formatted pattern in information, the system comprising:

an input layer *(12)* that receives data representative of physical characteristics or representations of physical characteristics within an input context of the physical characteristics and transforms the data into a Fourier series in Fourier space wherein the input context is encoded in time as delays corresponding to modulation of the Fourier series at corresponding frequencies;

a memory *(20)* comprising a set of initial ordered Fourier series;

an association layer *(14)* that receives a plurality of the Fourier series in Fourier space from the memory, recognizes a pattern in information represented by the Fourier series, forms a string comprising a sum of Fourier series, and stores the string in memory;

a string ordering layer *(16)* that receives the string and at least one ordered Fourier series from the memory, orders the Fourier series contained in the string by establishing an order formatted pattern in information to form an ordered string, and stores the ordered string in memory; and

a predominant configuration layer *(18)* that receives multiple ordered strings from the memory, forms complex ordered strings from the ordered strings, stores the complex ordered strings to the memory, and activates the components of any of the

layers of the system to recognize a pattern in information and establish an order formatted pattern in information.

157. *(at page 21, line 9 to page 22, line 33, the italicized reference numbers refer to Fig. 5)* A method of recognizing a pattern in information, the method comprising:

a.) generating an activation probability parameter based on a prior activation probability parameter and a weighting based on an activation rate of the corresponding component;
(probability parameter generator 66)

b.) storing the activation probability parameter in memory *(20)*;

b.) generating a probability operand based on the activation probability parameter;
(activation probability operand generator 70)

d.) if said probability operand is a desired value, activating any component of one or more of the group consisting of an input layer *(12)*, an association layer *(14)*, a string ordering layer *16)*, and a predominant configuration layer *(18)*, the activation being based on the activation probability parameter, wherein a pattern in information is recognized when said probability operand is said desired value;

e.) repeating steps a-d until a pattern is recognized in the information.

158. *(page 21, line 9 to page 22, line 33)* A method according to claim 157, wherein said probability operand having a value selected from a set of zero and one.

159. *(page 21, line 9 to page 22, line 33)* A method according to claim 158, wherein said desired value is one.

160. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15, page 23, lines 8-21)* A computer-readable medium on which is stored a computer program for providing a method for recognizing a pattern in information comprising data, the computer program comprising instructions which, when executed by a computer, perform the steps of:

encoding data as parameters of a plurality of Fourier components in Fourier space;

(Fig. 2, processor (22), described at page 8 lines 21-22)

adding at least two of said Fourier components together to form at least one Fourier series in Fourier space;

(Fig. 2 described at page 13 lines 4-6)

sampling at least one of said Fourier series in Fourier space with a filter to form a sampled Fourier series;

(Fig. 2, filter 34, described at page 13 lines 7-10)

modulating said sampled Fourier series in Fourier space with said filter to form a modulated Fourier series;

(Fig. 2, filter 34, described at page 13 lines 7-10)

determining a spectral similarity between said modulated Fourier series and another Fourier series;

(Fig. 2, spectral similarity analyzer 36, described at page 13 lines 10-15)

determining a probability expectation value based on said spectral similarity;

(Fig. 2, probability expectation analyzer 38, described at page 13 lines 14-17)

generating a probability operand based on said probability expectation value; and

(Fig. 2, probability operand generator 40, described at page 13 lines 17-20)

selecting a desired value for said probability operand, wherein recognition of a pattern in said information is obtained when said probability operand having said desired value.

(Fig. 2, described on page 13, lines 20-26, in this disclosed example, the desired probability operand value was selected to be one, but can be any value desired by the user. When the desired probability operand value is a desired value, a pattern is recognized. In the particular disclosed example on page 13, the Fourier series containing the recognized pattern is combined with said another Fourier series to a provide string of recognized information represented by the Fourier series (which is recited in dependent claim 162). The recognized string can be increased in size as desired by repeating the steps of the method. Recognition is also referred to as "association" or "associated information" in the application.)

161. *(page 6, line 25 to page 7, line 10; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein said data is inputted from a transducer which transduces physical data into computer readable data.

162. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, further comprising adding said modulated Fourier series and said another Fourier series to form a string of Fourier series in Fourier space when said probability operand has said desired value.

163. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 162, further comprising storing said string of Fourier series to a memory.

164. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein said another Fourier series represents known information.

165. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein said steps of adding said plurality of Fourier components together, sampling at least one of said plurality of Fourier series in Fourier space, modulating said sampled Fourier series in Fourier space, determining a spectral similarity between said modulated Fourier series and another one of said plurality of Fourier series, determining a probability expectation value, and generating a probability operand are repeated until a said probability operand has said desired value.

166. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein said value of said

probability operand is selected from a set of zero and one; and wherein said desired value is one.

167. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein said step of encoding data further comprises modulating at least one of said Fourier components to provide an input context.

168. *(page 6, line 25 to page 7, line 10)* A computer-readable medium according to claim 160, wherein inputted information comprises said data and an input context, said input context mapping on a one to one basis to a physical context, said physical context being a relationship between physical characteristics represented by said inputted information.

169. *(page 8, lines 19-29)* A computer-readable medium according to claim 168, wherein each Fourier component of said at least one Fourier series comprises a quantized amplitude, a frequency, or a phase angle.

170. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein said step of adding at least two Fourier components together is conducted to provide at least two Fourier series.

171. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein said data is representative of physical characteristics and said Fourier series in Fourier space is selected from one of:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho_0}}N_{m_{z_0}}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_m}}\right)\frac{N_{m_{\rho0}}\rho_{0_m}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_m}}\right)\frac{N_{m_{z0}}z_{0_m}}{2}\right)$$

and

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}\frac{4}{\rho_{0_m}z_{0_m}}a_{0_m}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_m}}\right)\frac{N_{m_{\rho0}}\rho_{0_m}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_m}}\right)\frac{N_{m_{z0}}z_{0_m}}{2}\right)$$

wherein a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho0}}$, $N_{m_{z0}}$, ρ_{0_m}, and z_{0_m} are data parameters.

172. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 171, wherein each of $N_{m_{\rho0}}$ and $N_{m_{z0}}$ is proportional to a rate of change of said physical characteristics, and each of ρ_{0_m} and z_{0_m} is inversely proportional to an amplitude of said physical characteristics.

173. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 171, wherein each of $N_{m_{\rho0}}$ and $N_{m_{z0}}$ is proportional to said amplitude of said physical characteristics, and each of ρ_{0_m} and z_{0_m} is inversely proportional to said rate of change of said physical characteristics.

174. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 171, wherein each of $N_{m_{\rho0}}$ and $N_{m_{z0}}$ is proportional to a duration of a signal response of at least one input transducer; and each of ρ_{0_m} and z_{0_m} is inversely proportional to said physical characteristics.

175. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 167, wherein step of encoding said data further comprises encoding said input context as a characteristic time delay which corresponds to a characteristic modulation of said Fourier components or Fourier series at a frequency within a band.

176. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 175, wherein said characteristic modulation frequency band represents said input context according to at least one of a transducer, a specific transducer element, and at least one of fundamental relationship including a physical context, a temporal order, a cause and effect relationships including a temporal order, a size order, an intensity order, a before-and-after order, a top-and-bottom order, and a left-and-right order.

177. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 176, wherein said transducer has n levels of subcomponents, and is assigned a master time interval with n+1 sub time intervals in a hierarchical manner corresponding to said n levels of the transducer subcomponents, and wherein a data stream from a n^{th} level subcomponent of said transducer is recorded as a function of time in the n+1 sub time intervals, each of said n+1 time intervals representing a time delay that corresponds to said characteristic modulation frequency band representing said input context.

178. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 177, wherein the input context is based on the identity of the specific transducer and transducer subcomponents.

179. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 177, wherein the characteristic modulation having a frequency within the band in Fourier space is represented by $e^{-j2\pi f t_0}$ which corresponds to the time delay $\delta(t - t_0)$ wherein f is the frequency variable, t is the time variable, and t_0 is the time delay.

180. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 179, wherein the step of adding at least two Fourier components together further comprises storing the characteristic modulation frequency in a distinct memory location within the band encoded as a delay in time.

181. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 179, wherein the Fourier series in Fourier space, has a characteristic modulation having a frequency within the band represented by $e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}$ and is selected from one of:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho_0}}N_{m_{z_0}}e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho_0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho_0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z_0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z_0}}}{2}\right)$$

and

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}\frac{4}{\rho_{0_m}z_{0_m}}e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho_0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho_0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z_0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z_0}}}{2}\right)$$

wherein $\rho_{t_m}=v_{t_m}t_{t_m}$ is the modulation factor which corresponds to the physical time delay t_{t_m}, $\rho_{fb_m}=v_{fb_m}t_{fb_m}$ is the modulation factor which corresponds to the specific transducer time delay t_{fb_m}, v_{t_m} and v_{fb_m} are constants such as the signal propagation velocities, a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho_0}}$, $N_{m_{z_0}}$, ρ_{0_m}, and z_{0_m} are data parameters.

182. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 181, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

183. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 181, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each

Fourier component is inversely proportional to the rate of change of the physical characteristic.

184. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 181, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

185. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 179, wherein the string has a characteristic modulation having a frequency within the band represented by $e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}$ is selected from one of:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho_0}}N_{s,m_{z_0}}e^{-jk_\rho\left(\rho_{fb_{s,m}}+\rho_{t_{s,m}}\right)}$$

$$\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z_0}}z_{0_{s,m}}}{2}\right)$$

and

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}\frac{4}{\rho_{0_{s,m}}z_{0_{s,m}}}e^{-jk_\rho\left(\rho_{fb_{s,m}}+\rho_{t_{s,m}}\right)}$$

$$\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z_0}}z_{0_{s,m}}}{2}\right)$$

wherein $\rho_{t_{s,m}}=v_{t_{s,m}}t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fb_{s,m}}=v_{fb_{s,m}}t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{t_{s,m}}$ and $v_{fb_{s,m}}$ are constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho_0}}$, $N_{s,m_{z_0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters.

186. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 185, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the

physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

187. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 185, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

188. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 185, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

189. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 179, wherein the Fourier series in Fourier space, has a characteristic modulation having a frequency within the band represented by $e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}$ and is selected from one of:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho_0}}N_{m_{z_0}}e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho_0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho_0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z_0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z_0}}}{2}\right)$$

and

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}\frac{4}{\rho_{0_m}z_{0_m}}e^{-jk_\rho(\rho_{fb_m}+\rho_{t_m})}\sin\left(k_\rho\frac{N_{m_{\rho_0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho_0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z_0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z_0}}}{2}\right)$$

wherein $\rho_{t_m}=v_{t_m}t_{t_m}$ is the modulation factor which corresponds to the physical time delay t_{t_m}, $\rho_{fb_m}=v_{fb_m}t_{fb_m}$ is the modulation factor which corresponds to the specific transducer time delay t_{fb_m}, v_{t_m} and v_{fb_m} are constants such as the signal propagation velocities, a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho_0}}$, $N_{m_{z_0}}$, ρ_{0_m}, and z_{0_m} are data parameters.

190. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 189, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

191. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 189, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

192. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 189, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

193. *(page 16, line 16 to page 21, line 8)* A computer-readable medium according to claim 189, wherein each Fourier series of the string is multiplied by the Fourier transform of the delayed Gaussian filter represented by $e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}(v_{sz0}k_z)}$ wherein the filter established the association to form the string, wherein the string is represented by:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}} a_{0_{s,m}} N_{s,m_{\rho_0}} N_{s,m_{z_0}} e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}(v_{sz0}k_z)}$$

$$e^{-jk_\rho\left(\rho_{fb_{s,m}}+\rho_{t_{s,m}}\right)}\sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z - n\frac{2\pi}{v_{s,m}t_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

wherein $v_{s\rho 0}$ and v_{sz0} are constants such as the signal propagation velocities in the ρ and z directions, respectively, $\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}$ and $\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}$ are delay parameters and $\alpha_{s\rho 0}$ and α_{sz0}

are half-width parameters of a corresponding Gaussian filter in the ρ and z directions, respectively, $\rho_{t_{s,m}} = v_{t_{s,m}} t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fb_{s,m}} = v_{fb_{s,m}} t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{t_{s,m}}$ and $v_{fb_{s,m}}$ are constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho_0}}$, $N_{s,m_{z_0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters.

194. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 193, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

195. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 193, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

196. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A method according to claim 193, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

197. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein the step of adding at least two of said Fourier components together further comprises creating transducer strings by obtaining a Fourier series from at least two selected transducers and adding the Fourier series.

198. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 197, further comprises selecting transducers that are active simultaneously.

199. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 198, wherein the transducer string is stored in a distinct memory location wherein a characteristic modulation having a frequency within the band in Fourier space is represented by $e^{-j2\pi f t_0}$ which corresponds to the time delay $\delta(t-t_0)$ wherein f is the frequency variable, t is the time variable, and t_0 is the time delay.

200. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 199, wherein the step of adding at least two of said Fourier components together further comprises recalling any part of the transducer string from the distinct memory location which thereby causes additional Fourier series of the transducer string to be recalled.

201. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein the filter is a time delayed Gaussian filter in the time domain.

202. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 201, wherein the Gaussian filter comprises a plurality of cascaded stages each stage having a decaying exponential system function between stages.

203. *(page 64, lines 33-36)* A computer-readable medium according to claim 201, wherein the Gaussian filter is modulated in the time domain to produce a frequency shift of the sampling and modulation in the frequency domain.

204. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 201, wherein the filter is characterized in time by:

$$\frac{\alpha}{\sqrt{2\pi}} e^{\frac{\left(t-\frac{\sqrt{N}}{\alpha}\right)^2}{\frac{2}{\alpha^2}}}$$

wherein $\frac{\sqrt{N}}{\alpha}$ is a delay parameter, α is a half-width parameter, and t is the time parameter.

205. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 201, wherein the filter, in frequency space, is characterized by:

$$e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

wherein $\frac{\sqrt{N}}{\alpha}$ and α are a corresponding delay parameter and a half-width parameter in time, respectively, and f is the frequency parameter.

206. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, wherein the probability expectation value is based upon Poissonian probability.

207. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 206, wherein the probability expectation value is characterized by

$$\prod_s \left[p_{\uparrow_s} + \left(P - p_{\uparrow_s}\right) \exp\left[-\beta_s^{-2} \left(\frac{1 - \cos 2\phi_s}{2} \right) \right] \cos\left(\delta_s + 2 \sin \phi_s\right) \right]$$

wherein P is the maximum probability of at least one other Fourier series being associated with a first Fourier series, $p_{\uparrow_s}$ is a probability of at least one other Fourier series being associated with a first Fourier series in the absence of coupling of the first Fourier series with the at least one other Fourier series, β_s^2 is a number that represents the amplitude of spectral similarity between at least two filtered or unfiltered Fourier series, ϕ_s represents the frequency difference angle between at least two filtered or unfiltered Fourier series, and δ_s, is a phase factor.

208. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 207, wherein β_s^2 is characterized by

$$\beta_s^2 = (8\pi)^2 \frac{1}{\sqrt{2\pi}} \sqrt{\frac{\alpha_1^2 \alpha_s^2}{\alpha_1^2 + \alpha_s^2}}$$

$$\sum_{m_1=1}^{M_1} a_{0_{m_1}} N_{m_1} \sum_{m_s=1}^{M_s} a_{0_{m_s}} N_{m_s} \exp - \left\{ \frac{\frac{\alpha_1^2 \alpha_s^2}{\alpha_1^2 + \alpha_s^2} \left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \frac{N_{m_1}\rho_{0_{m}}}{2v_{m_1}} - \frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} \right)^2}{2} \right\}$$

$\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

209. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 208, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

210. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 208, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

211. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 208, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

212. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 208, wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1} \frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} - \sum_{m_s=1}^{M_s} \frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}}\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1} \frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}}}$$

$\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

213. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 212, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

214. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 212, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

215. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 212, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

216. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15, and page 23, lines 8-21)* A computer-readable medium according to claim 208, wherein β_s^2 is characterized by

$$\beta_s^2=(8\pi)^2\frac{1}{\sqrt{2\pi}}\sqrt{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}}\sum_{m_1=1}^{M_1}a_{0_{m_1}}N_{m_1}\sum_{m_s=1}^{M_s}a_{0_{m_s}}N_{m_s}$$

$$\exp-\left\{\frac{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}\left(\frac{\sqrt{N_1}}{\alpha_1}-\frac{\sqrt{N_s}}{\alpha_s}+\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}}+\frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}}+\frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right)-\left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}}+\frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}}+\frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)^2}{2}\right\}$$

wherein $\rho_{t_{m_1}}=v_{t_{m_1}}t_{t_{m_1}}$ and $\rho_{t_{m_s}}=v_{t_{m_s}}t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}}=v_{fb_{m_1}}t_{fb_{m_1}}$ and $\rho_{fb_{m_s}}=v_{fb_{m_s}}t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$, $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

217. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium according to claim 216, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

218. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium according to claim 216, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and

z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

219. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium according to claim 216, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

220. *(page 16, line 16 to page 21, line 8)* A computer-readable medium according to claim 208, wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb m_1}}{v_{fb m_1}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right) - \sum_{m_s=1}^{M_s}\left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} + \frac{\rho_{fb m_s}}{v_{fb m_s}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb m_1}}{v_{fb m_1}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right)}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb m_1} = v_{fb m_1} t_{fb m_1}$ and $\rho_{fb m_s} = v_{fb m_s} t_{fb m_s}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb m_1}$ and $t_{fb m_s}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb m_1}$, and $v_{fb m_s}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1, and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

221. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium according to claim 220, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m}

and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

222. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium according to claim 220, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

223. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium according to claim 220, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

224. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 160, further comprising linking at least two Fourier series stored in a memory comprising the steps of

a.) generating a probability expectation value that recalling any part of one of the Fourier series from the memory causes at least another Fourier series to be recalled from the memory;

b.) storing the probability expectation value to memory;

c.) generating a probability operand based on the probability expectation value, and

d.) recalling the at least another Fourier series from the memory if the operand has a desired value.

225. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 224, wherein said probability operand is a value selected from a set of zero and one.

information and establishing an order formatted pattern in information with respeet to standard ordered information, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) obtaining a string comprising a sum of Fourier series from a memory, said string representing information;

(string memory section 44)

b.) selecting at least two filters from a selected set of filters;

(two filters 48 and 50 from a set of filters 52)

c.) sampling the string with the filters such that each of the filters produces a sampled Fourier series, each Fourier series comprising a subset of the string;

d.) modulating each of the sampled Fourier series in Fourier space with the corresponding selected filter such that each filter produces an order formatted Fourier series;

e.) adding the order formatted Fourier series produced by each filter to form a summed Fourier series in Fourier space;

f.) obtaining an ordered Fourier series from the memory;

(high level memory section 54)

g.) determining a spectral similarity between the summed Fourier series and the ordered Fourier series;

(spectral similarity analyzer 56)

h.) determining a probability expectation value based on the spectral similarity;

(probability expectation value analyzer 58)

i.) generating a probability operand based on the probability expectation value;

(probability operand generator 60)

j.) repeating steps b-i until the probability operand has a desired value, when the probability operand has a desired value a pattern in information has been recognized and an order formatted pattern in the information has been established;

(Processor 42 determines the value of the probability operand. The desired value in the disclosed example on pages 16-18 is one, but can be any value as desired by the user. When the probability operand determined by processor 42 is equal to the desired value a pattern has been recognized.)

k.) storing the summed Fourier series to an intermediate memory;

(intermediate memory section 62)

l.) removing the selected filters from the selected set of filters to form an updated set of filters;

(set of filters 52)

m.) removing the subsets from the string to obtain an updated string;

n.) selecting an updated filter from the updated set of filters;

(selecting updated filter 62 from set of filters 52)

o.) sampling the updated string with the updated filter to form a sampled Fourier series comprising a subset of the string;

p.) modulating the sampled Fourier series in Fourier space with the corresponding selected updated filter to form an updated order formatted Fourier series;

q.) recalling the summed Fourier series from the intermediate memory;

(intermediate memory section 62)

r.) adding the updated order formatted Fourier series to the summed Fourier series from the intermediate memory to form an updated summed Fourier series in Fourier space;

s.) obtaining an updated ordered Fourier series from the high level memory;

(high level memory section 54)

t.) determining a spectral similarity between the updated summed Fourier series and the updated ordered Fourier series;

u.) determining a probability expectation value based on the spectral similarity;

v.) generating a probability operand based on the probability expectation value;

w.) repeating steps n-v until the probability operand has a desired value or all of the updated filters have been selected from the updated set of filters, when the probability operand has a desired value a pattern in information has been recognized an order formatted pattern in the information has been established;

(processor 42)

x.) if all of the updated filters have been selected before the probability operand has a desired value, then clearing the intermediate memory and returning to step b;

y.) if the probability operand has a desired value, then storing the updated summed Fourier series to the intermediate memory;

z.) repeating steps l-y until one of the following set of conditions is satisfied: the updated set of filters is empty, or the remaining subsets of the string of step m.) is nil; and

(processor 42)

aa.) storing the Fourier series in the intermediate memory in the high level memory.

(high level memory section 54)

238. (*page 2, lines 15-25, page 16, line 16 to page 21, line 8)* A computer-readable medium according to claim 237, wherein information is represented by a sum of Fourier series in Fourier space.

239. *(page 16, line 16 to page 21, line 8; page 7, lines 14-16; page 10, line 34 to page 11, line 3; page 10, line 34 to page 12, line 2)* A computer-readable medium according to claim 237, further comprising encoding data which includes modulating at least one of said Fourier components to provide an input context.

240. *(page 6, line 25 to page 7, line 10)* A computer-readable according to claim 237, wherein inputted information comprises data and an input context, said input context mapping on a one to one basis to a physical context, said physical context being a relationship between physical characteristics represented by said inputted information.

241. *(page 8, lines 19-29)* A computer-readable medium according to claim 237, wherein each Fourier component of said at least one Fourier series comprises a quantized amplitude, a frequency, or a phase angle.

242. (*page 16, line 16 to page 21, line 8)* A computer-readable medium according to claim 237, wherein said probability operands having a value selected from a set of zero and one.

243. (*page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 242, wherein said desired values are one.

244. *(page 12, lines 25-34; page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 237, wherein the high level memory is initialized with standard inputs.

245. *(page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 237, wherein the ordering is according to one of the list of: temporal order, cause and effect relationships, size order, intensity order, before-after order, top-bottom order, or left-right order.

246. *(page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 237, wherein each filter of the set of filters is a time delayed Gaussian filter having a half-width parameter α which determines the amount of the string that is sampled.

247. *(page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 237, wherein each filter of the set of filters is a time delayed Gaussian filter having a delay parameter $\frac{\sqrt{N}}{\alpha}$ which corresponds to a time point.

248. *(page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 247, wherein each Fourier series of the string is multiplied by the Fourier transform of the delayed Gaussian filter represented by $e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz 0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}(v_{sz0}k_z)}$ wherein the filter established the correct order to form the string, wherein the ordered string is represented by:

$$\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}} a_{0_{s,m}} N_{s,m_{\rho_0}} N_{s,m_{z_0}} e^{-\frac{1}{2}\left(v_{s\rho 0}\frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0}k_\rho)} e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2} e^{-j\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}(v_{sz0}k_z)}$$

$$e^{-jk_\rho\left(\rho_{fb_{s,m}}+\rho_{t_{s,m}}\right)}\sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z - n\frac{2\pi}{v_{s,m}t_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

wherein $v_{s\rho 0}$ and v_{sz0} are constants such as the signal propagation velocities in the ρ and z directions, respectively, $\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}$ and $\frac{\sqrt{N_{sz0}}}{\alpha_{sz0}}$ are delay parameters and $\alpha_{s\rho 0}$ and α_{sz0} are half-width parameters of a corresponding Gaussian filter in the ρ and z directions,

respectively, $\rho_{t_{s,m}} = v_{t_{s,m}} t_{t_{s,m}}$ is the modulation factor which corresponds to the physical time delay $t_{t_{s,m}}$, $\rho_{fb_{s,m}} = v_{fb_{s,m}} t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{t_{s,m}}$ and $v_{fb_{s,m}}$ are constants such as the signal propagation velocities, $a_{0_{s,m}}$ is a constant, k_ρ and k_z are the frequency variables, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho_0}}$, $N_{s,m_{z_0}}$, $\rho_{0_{s,m}}$, and $z_{0_{s,m}}$ are data parameters.

249. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 248, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

250. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 248, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

251. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 248, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

252. *(page 64, lines 33-36)* A computer-readable medium to claim 248, wherein $v_{s,m} t_{0_{s,m}} = \rho_{0_{s,m}}$ and $k_\rho = k_z$ such that the string in Fourier space is one dimensional in terms of k_ρ and is represented by

$$\sum_{s=1}^{S} \sum_{m=1}^{M_s} \sum_{n=-\infty}^{\infty} a_{0_{s,m}} N_{s,m_{\rho_0}} e^{-\frac{1}{2}\left(v_{s\rho 0} \frac{k_\rho}{\alpha_{s\rho 0}}\right)^2} e^{-j\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}(v_{s\rho 0} k_\rho)} e^{-jk_\rho \rho_{fb_{s,m}}} \sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}} \rho_{0_{s,m}}}{2}\right)$$

wherein $v_{s\rho 0}$ is a constant such as the signal propagation velocity in the ρ direction, $\frac{\sqrt{N_{s\rho 0}}}{\alpha_{s\rho 0}}$ is a delay parameter and $\alpha_{s\rho 0}$ is a half-width parameter of a corresponding

Gaussian filter in the k_ρ-space, $\rho_{fb_{s,m}} = v_{fb_{s,m}} t_{fb_{s,m}}$ is the modulation factor which corresponds to the specific transducer time delay $t_{fb_{s,m}}$, $v_{fb_{s,m}}$ is a constant such as the signal propagation velocity, $a_{0_{s,m}}$ is a constant, k_ρ is the frequency variable, n, m, s, M_s, and S are integers, and $N_{s,m_{\rho_0}}$ and $\rho_{0_{s,m}}$ are data parameters.

253. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 252, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

254. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 252, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

255. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 252, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

256. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 237, wherein the probability expectation value is based upon Poissonian probability.

257. *(page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 256, wherein the probability expectation value is characterized by

$$\prod_s \left[p_{\uparrow_s} + \left(P - p_{\uparrow_s}\right) \exp\left[-\beta_s^{-2} \left(\frac{1 - \cos 2\phi_s}{2} \right) \right] \cos\left(\delta_s + 2\sin\phi_s\right) \right]$$

wherein P is the maximum probability that at least one other Fourier series is active given that a first Fourier series is active, $p_{\uparrow_s}$ is a probability of a Fourier series becoming active in the absence of coupling from at least one other active Fourier series, β_s^2 is a number that represents the amplitude of spectral similarity between at least two filtered or unfiltered Fourier series, ϕ_s represents the frequency difference angle between at least two filtered or unfiltered Fourier series, and δ_s, is a phase factor.

258. *(page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 257, wherein β_s^2 is characterized by

$$\beta_s^2 = (8\pi)^2 \frac{1}{\sqrt{2\pi}} \sqrt{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}} \sum_{m_1=1}^{M_1} a_{0_{m_1}} N_{m_1} \sum_{m_s=1}^{M_s} a_{0_{m_s}} N_{m_s}$$

$$\exp-\left\{ \frac{\frac{\alpha_1^2\alpha_s^2}{\alpha_1^2+\alpha_s^2}\left(\frac{\sqrt{N_1}}{\alpha_1}-\frac{\sqrt{N_s}}{\alpha_s}+\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}}+\frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}}+\frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right)-\left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}}+\frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}}+\frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)^2}{2} \right\}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1 and M_s are integers, $a_{0_{m_1}}$, $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

259. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 258, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each

Fourier component is inversely proportional to the amplitude of the physical characteristic.

260. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 258, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

261. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 258, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

262. *(page 16, line 16 to page 21, line 8)* A computer-readable medium to claim 258, wherein ϕ_s is characterized by

$$\phi_s = \frac{\pi\left(\frac{\sqrt{N_1}}{\alpha_1} - \frac{\sqrt{N_s}}{\alpha_s} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right) - \sum_{m_s=1}^{M_s}\left(\frac{N_{m_s}\rho_{0_{m_s}}}{2v_{m_s}} + \frac{\rho_{fb_{m_s}}}{v_{fb_{m_s}}} + \frac{\rho_{t_{m_s}}}{v_{t_{m_s}}}\right)\right)}{\frac{\sqrt{N_1}}{\alpha_1} + \sum_{m_1=1}^{M_1}\left(\frac{N_{m_1}\rho_{0_{m_1}}}{2v_{m_1}} + \frac{\rho_{fb_{m_1}}}{v_{fb_{m_1}}} + \frac{\rho_{t_{m_1}}}{v_{t_{m_1}}}\right)}$$

wherein $\rho_{t_{m_1}} = v_{t_{m_1}} t_{t_{m_1}}$ and $\rho_{t_{m_s}} = v_{t_{m_s}} t_{t_{m_s}}$ are the modulation factors which corresponds to the physical time delays $t_{t_{m_1}}$ and $t_{t_{m_s}}$, respectively, $\rho_{fb_{m_1}} = v_{fb_{m_1}} t_{fb_{m_1}}$ and $\rho_{fb_{m_s}} = v_{fb_{m_s}} t_{fb_{m_s}}$ are the modulation factors which corresponds to the specific transducer time delay $t_{fb_{m_1}}$ and $t_{fb_{m_s}}$, respectively, $v_{t_{m_1}}$, $v_{t_{m_s}}$, $v_{fb_{m_1}}$, and $v_{fb_{m_s}}$ are constants such as the signal propagation velocities, $\frac{\sqrt{N_1}}{\alpha_1}$ and $\frac{\sqrt{N_s}}{\alpha_s}$ correspond to delay parameters of a first and s-th time delayed Gaussian filter, respectively, α_1 and α_s corresponding half-width parameters of a first and s-th time delayed Gaussian filter, respectively, M_1, and M_s are integers, $a_{0_{m_1}}$ and $a_{0_{m_s}}$ are constants, v_{m_1} and v_{m_s} are constants such as the signal propagation velocities, and N_{m_1}, N_{m_s}, $\rho_{0_{m_1}}$, and $\rho_{0_{m_s}}$ are data parameters.

263. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 262, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the rate of change of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.

264. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 262, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic.

265. *(page 16, line 16 to page 21, line 8; page 8, line 30 to page 10, line 3)* A computer-readable medium to claim 262, wherein each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of a signal response of each transducer and each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic.

266. *(page 21, line 9 to page 22, line 33)* A computer-readable medium on which is stored a computer program for providing a method for recognizing a pattern in information and establishing an order formatted pattern in information, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) recording ordered strings comprising Fourier series to a high level memory, Fourier series representing information;

(high level memory section 54)

b.) forming association between Fourier series of the ordered strings to form complex strings and recognizing a pattern in information;

(association layer 14)

c.) ordering the Fourier series of the complex strings to form complex ordered strings representing recognized information and establishing an order formatted pattern in information, and

(string ordering layer 16)

d.) storing the complex ordered strings to the high level memory.

(complex ordered string section 72, high level memory section 54)

267. *(page 21, line 9 to page 22, line 33)* A computer-readable medium on which is stored a computer program for providing a method for recognizing a pattern in information comprising data and forming a predominant configuration, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) generating an activation probability parameter based on a prior activation probability parameter and a weighting based on an activation rate of the corresponding component;

(activation probability parameter generator 66)

b.) storing the activation probability parameter in memory;

(memory 20)

c.) generating a probability operand based on the activation probability parameter;

(activation probability operand generator 70)

d.) if said probability operand is a desired value, activating any component of one or more of the group consisting of an input layer, an association layer, a string ordering layer, and a predominant configuration layer, the activation being based on the activation probability parameter, wherein recognition of a pattern in information is achieved when said probability operand is said desired value, and

(input layer 12, association layer 14, string ordering layer 16, predominant configuration layer 18, while the desired value is one in the disclosed example, any suitable value can be selected by the user)

e.) repeating steps a-d to form a predominate configuration.

268. *(page 21, line 9 to page 22, line 33)* A method according to claim 267, wherein said probability operand having a value selected from a set of zero and one.

269. *(page 21, line 9 to page 22, line 33)* A method according to claim 268, wherein said desired value is one.

270. *(page 1, line 32 to page 2, line 14; page 21, line 9 to page 23, line 26)* A computer program product for recognizing a pattern in information for use in a computer including a central processing unit and a memory, the memory maintaining a set of initial ordered Fourier series, the computer program product comprising:

a computer readable medium;

program code means embodied in the computer readable medium, the program code means comprising:

means for receiving data representative of physical characteristics or representations of physical characteristics within an input context of the physical characteristics and transforming the data into a Fourier series in Fourier space wherein the input context is encoded in time as delays corresponding to modulation of the Fourier series at corresponding frequencies;

(input layer 12)

means for receiving a plurality of the Fourier series in Fourier space including at least one ordered Fourier series from the memory, forming a string comprising a sum of the Fourier series and storing the string in memory;

(association layer 14, memory 20)

means for retrieving the string from memory, ordering the Fourier series contained in the string to form an ordered string and storing the ordered string in memory; and

(string ordering layer 16)

means for retrieving multiple ordered strings from the memory, forming complex ordered strings from the ordered strings and storing the complex ordered strings to the memory.

(predominant configuration layer 18)

271. *(page 1, line 32 to page 2, line 14; page 21, line 9 to page 23, line 26)* A method of recognizing a pattern in information comprising data and establishing an order formatted pattern in information, the method comprising:

encoding inputted data as a plurality of Fourier components in Fourier Space and form a plurality of Fourier series from said Fourier

components, said Foureir series representing information comprising data and input context;

associating said plurality of Fourier series with each other according to spectral similarities between said plurality of Fourier series to form a string, said string being a sum of associated plurality of Fourier series;

ordering said plurality of Fourier series within said string based on relative degree of association of order formatted subsets of said string with relevant aspects of a standard ordered string;

(predominant configuration layer 18 receives ordered strings from the high level memory section 54 and form more complex ordered strings)

assigning an activation probability parameter to each of said plurality of Fourier components and to each of said plurality of Fourier series to produce a predominant configuration string, generating a probability operand based on said activation probability parameter, said probability operand determining whether an activation of any one of said plurality of Fourier component and said plurality of Fourier series is to cause an activation of an associated another of said plurality of Fourier components and said plurality of Fourier series from said ordered string; and

(the predominant configuration layer 18 includes an activation probability parameter generator 66)

storing said predominant configuration string in a memory, thereby a pattern in newly inputted information can be recognized.

(memory 20)

272. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 271, wherein said step of associating said plurality of Fourier series comprises sampling and modulating at least one of said plurality of Fourier series with at least one filter.

273. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 272, wherein said at least one filter comprises a time delayed Gaussian filter in time domain.

274. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 271, wherein said step of ordering said plurality of Fourier series comprises sampling and modulating at least two of said plurality of Fourier series with at least two filters from a set of filters.

275. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 274, wherein said at least two filters comprises a time delayed Gaussian filter in time domain.

276. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 271, wherein said step of associating ones of said plurality of Fourier series comprises coupling said plurality of Fourier series based on a probability distribution.

277. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 271, wherein said probability distribution is a Poissonian distribution.

278. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 271, wherein said coupling is based on a spectral similarity of said plurality of Fourier series.

279. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 271, wherein said probability operand is selected from the group of one and zero.

280. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 279, wherein said desired value is one.

281. *(at page 7, lines 11-33 and page 23, lines 8-26, the italicized reference numbers refer to Fig. 1)* A system *(10)* for recognizing a pattern in information comprising data, the method comprising:

an input layer *(12)* operable to receive said data, and to encode said received data as parameters of a plurality of Fourier series in Fourier space, said plurality of Fourier series including input context of said data;

a memory *(20)* comprising a set of initial ordered Fourier series;

an association layer *(14)* operable to add associated Fourier series together to form a string;

an ordering layer *(16)* operable to order said string based on relative degree of association of order formatted subsets of said string with relevant aspects of characteristics with respect to at least one of said initial ordered Fourier series to form an ordered string;

a predominant configuration layer *(18)* for receiving said ordered string and for assigning an activation probability parameter to each of said plurality of Fourier series to produce a predominant configuration string, generating a probability operand based on said activation probability parameter, said probability operand determining whether an activation of any one of said plurality of Fourier components and said plurality of Fourier series is to cause an activation of an associated another one of said plurality of Fourier components or Fourier series; and

a memory *(20)* adapted to store said predominant configuration string, said predominant configuration string allowing a determination of a relative association of a newly inputted information to said inputted information already processed, thereby recognition of a pattern in said information can be recognized.

282. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A system according to claim 281, wherein said association layer is operable to associate Fourier series based on a spectral similarity between one another.

283. *(page 1, line 32 to page 2, line 14; page 21, line 9 to page 23, line 26)* A system according to claim 281, wherein said probability operand is determined based on a historical value of said activation probability parameter and an activation rate of respective Fourier series.

284. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A system according to claim 281, wherein said information context is encoded in time as delays corresponding to modulation of each Fourier component and Fourier series at corresponding frequencies.

285. *(page 1, line 32 to page 2, line 14; page 21, line 9 to page 23, line 26)* A method of recognizing a pattern in information comprising data, the method comprising:

providing an input layer operable to receive data;

providing an association layer operable to add associated portions of said data together to form a string;

providing an ordering layer operable to order said string based on a relative degree of association of order formatted subsets of said string with relevant aspects of information of a standard string to form an ordered string;

(predominant configuration layer 18 receives ordered strings from the high level memory section 54 and forms more complex ordered strings)

providing a predominant configuration layer operable to receive a plurality of ordered strings to form a complex ordered string therefrom;

assigning an activation probability parameter to each of said input layer, said association layer, said ordering layer and said predominant configuration layer, said activation probability parameter being determined based on a

historical value of said activation probability parameter and an activation rate of respective ones of said input layer, said association layer, said ordering layer and said predominant configuration layer;

(the predominant configuration layer 18 includes an activation probability parameter generator 66)

generating a probability operand based on the activation probability parameter; and

(activation probability operand generator 70)

activating one or more of said input layer, said association layer, said ordering layer, said predominant configuration, said ordering layer, said predominant configuration layer, and said association layer if said probability operand has a desired value, whereby a pattern in said information is recognized according to a historical associative pattern in said data.

(input layer 12, association layer 14, string ordering layer 16, predominant configuration layer 18, while the desired value is one in the disclosed example, any suitable value can be selected by the user)

286. *(page 16, line 16 to page 21, line 8)* A method according to claim 285, wherein said step of providing an ordering layer comprises ordering said string according to a plurality of associations between the information of the plurality of order formatted subset Fourier series and at least one ordered Fourier series from a high level memory.

287. *(page 7, lines 11-34)* A method according to claim 285, wherein said step of providing an input layer comprises providing an input layer operable to encode said received data as parameters of a plurality of Fourier series in Fourier space.

288. *(page 7, lines 11-34)* A method according to claim 285, wherein said step of providing an association layer comprises providing said association layer to associate Fourier series based on a spectral similarity between one another.

289. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 285, wherein said probability operand has a binary value of one and zero, and said desired value is one.

290. *(page 2, lines 15-33, page 8, line-25, page 13, lines1-26, and page 23, lines 8-26, referring to Fig. 2)* A computer readable medium having stored thereon a computer program to implement a method of recognizing a pattern in information comprising data, said computer program comprising a plurality of codes for executing the steps of:

encoding said data as parameters of a plurality of Fourier components in Fourier space;

(Fourier transform processor 22, described on page 8, line 20)

adding said plurality of Fourier components together to form a plurality of Fourier series in Fourier space, said plurality of Fourier series representing inputted information;

(page 13, lines 4-6)

sampling at least one of said plurality of Fourier series in Fourier space with a filter to form a sampled Fourier series;

(filter 34, described at page 13, lines 7-10)

modulating said sampled Fourier series in Fourier space with said filter to form a modulated Fourier series;

(filter 34, described at page 13, lines 7-10)

determining a spectral similarity between said modulated Fourier series and another one of said plurality of Fourier series;

(spectral similarity analyzer 36, described at page 13, lines 10-15)

determining a probability expectation value based on said spectral similarity;

(probability expectation analyzer 38, described at page 13, lines 14-17)

generating a probability operand based on said probability expectation value; and

(probability operand generator 40, described at page 13, lines 17-20)

adding said modulated Fourier series and said another Fourier series, if said probability operand has a desired value, to form a string of Fourier series in Fourier space, said string representing an association between Fourier series to thereby allow recognition of a pattern in the information.

(described on page 13, lines 20-26, when the desired probability operand value is a desired value, one in this example, a pattern is recognized and can be outputted as recognized. In the particular disclosed example on page 13, the recognized pattern is outputted in a manner such that the Fourier series is combined with said another Fourier series to a provide string of recognized information represented by the Fourier. The recognized string can be increased in size as desired by repeating the steps of the method.)

291. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 290, further comprising

storing said string of Fourier series to a memory.

292. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 290, wherein said probability operand has a value selected from the set of one and zero.

293. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer-readable medium according to claim 292, wherein said desired value is one.

294. *(page 16, line 16 to page 18, line 21, and page 23, lines 8-26, the italicized reference numbers refer to Fig. 4)* A method for recognizing a pattern in information and establishing an order formatted pattern in

information with respect to standard ordered information, the method comprising:

b.) obtaining a string comprising a sum of Fourier series from a memory, said string representing information;

(string memory section 44)

b.) selecting at least two filters from a selected set of filters;

(two filters 48 and 50 from a set of filters 52)

c.) sampling the string with the filters such that each of the filters produces a sampled Fourier series, each Fourier series comprising a subset of the string;

d.) modulating each of the sampled Fourier series in Fourier space with the corresponding selected filter such that each filter produces an order formatted Fourier series;

e.) adding the order formatted Fourier series produced by each filter to form a summed Fourier series in Fourier space;

f.) obtaining an ordered Fourier series from the memory;

(high level memory section 54)

g.) determining a spectral similarity between the summed Fourier series and the ordered Fourier series;

(spectral similarity analyzer 56)

h.) determining a probability expectation value based on the spectral similarity;

(probability expectation value analyzer 58)

i.) generating a probability operand based on the probability expectation value;

(probability operand generator 60)

j.) repeating steps b-i until the probability operand has a desired value, when the probability operand has a desired value a pattern in information has been recognized and an order formatted pattern in the information has been established;

(Processor 42 determines the value of the probability operand. The desired value in the disclosed example on pages 16-18 is one, but can be any value as desired by the user. When the probability operand determined by processor 42 is equal to the desired value a pattern has been recognized.)

k.) storing the summed Fourier series to an intermediate memory;

(intermediate memory section 62)

l.) removing the selected filters from the selected set of filters to form an updated set of filters;

(set of filters 52)

m.) removing the subsets from the string to obtain an updated string;

n.) selecting an updated filter from the updated set of filters;

(selecting updated filter 62 from set of filters 52)

o.) sampling the updated string with the updated filter to form a sampled Fourier series comprising a subset of the string;

p.) modulating the sampled Fourier series in Fourier space with the corresponding selected updated filter to form an updated order formatted Fourier series;

q.) recalling the summed Fourier series from the intermediate memory;

(intermediate memory section 62)

r.) adding the updated order formatted Fourier series to the summed Fourier series from the intermediate memory to form an updated summed Fourier series in Fourier space;

s.) obtaining an updated ordered Fourier series from the high level memory;

(high level memory section 54)

t.) determining a spectral similarity between the updated summed Fourier series and the updated ordered Fourier series;

u.) determining a probability expectation value based on the spectral similarity;

v.) generating a probability operand based on the probability expectation value;

w.) repeating steps n-v until the probability operand has a desired value or all of the updated filters have been selected from the updated set of filters, when the probability operand has a desired value a pattern in information has been recognized an order formatted pattern in the information has been established;

(processor 42)

x.) if all of the updated filters have been selected before the probability operand has a desired value, then clearing the intermediate memory and returning to step b;

y.) if the probability operand has a desired value, then storing the updated summed Fourier series to the intermediate memory;

z.) repeating steps l-y until one of the following set of conditions is satisfied: the updated set of filters is empty, or the remaining subsets of the string of step m.) is nil; and

(processor 42)

aa.) storing the Fourier series in the intermediate memory in the high level memory,

said updated summed Fourier series representing said plurality of Fourier series in said strings ordered according to a plurality of associations between the information of the plurality of order formatted subset Fourier series and the at least one ordered Fourier series from high level memory.

(high level memory section 54)

295. *(page 16, line 16 to page 21, line 8)* A method according to claim 294, wherein information is represented by a sum of Fourier series in Fourier space.

296. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A method according to claim 294, further comprising encoding data which includes modulating at least one of said Fourier components to provide an input context.

297. *(page 6, line 25 to page 7, line 10)* A method according to claim 294, wherein inputted information comprises data and an input context, said input context mapping on a one to one basis to a physical context, said physical context being a relationship between physical characteristics represented by said inputted information.

298. *(page 8, lines 19-29)* A method according to claim 294, wherein each Fourier component of said at least one Fourier series comprises a quantized amplitude, a frequency, or a phase angle.

299. *(page 1, line 32 to page 2, line 14, page 21, line 9 to page 23, line 26, referring to Fig. 5)* A computer readable medium having stored thereon a computer program to implement a method of recognizing a pattern in information comprising data and establishing an order formatted pattern in the information, said computer program comprising a plurality of codes for executing the steps of:

providing an input layer operable to receive data;

(input layer 12)

providing an association layer operable to add associated portions of said data together to form a string;

(association layer 14)

providing an ordering layer operable to order said string based on a relative degree of association of order formatted subsets of said string with relevant aspects of information of a standard string to form an ordered;

(string ordering layer 16)

providing a predominant configuration layer operable to receive a plurality of ordered strings to form a complex ordered string therefrom;

(predominant configuration layer 18)

assigning an activation probability parameter to each of said input layer, said association layer, said ordering layer and said predominant configuration layer, said activation probability parameter being determined based on a historical value of said activation probability parameter and an activation rate of respective ones of said input layer, said association layer, said ordering layer and said predominant configuration layer;

generating a probability operand based on the activation probability parameter; and

(activation probability parameter generator 66)

activating one or more of said input layer, said association layer, said ordering layer, said predominant configuration, said ordering layer, said predominant configuration layer, and said association layer if said probability operand has a desired value, whereby a pattern in said information is recognized according to a historical associative pattern in said data.

(input layer 12, association layer 14, string ordering layer 16, predominant configuration layer 18, while the desired value is one in the disclosed example, any suitable value can be selected by the user)

300. *(page 7, lines 11-34)* A computer readable medium according to claim 299, wherein said input layer is operable to encode said received data as parameters of a plurality of Fourier series in Fourier space.

301. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer readable medium according to claim 299, wherein said association layer is operable to associate ones of said plurality of Fourier series based on a spectral similarity between one another.

302. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer readable medium according to claim 299, wherein said probability operand has a binary value of one or zero

303. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15)* A computer readable medium according to claim 302, wherein said desired value is one.

304. *(page 1, line 29 to page 4, line 30, page 21, line 9 to page 23, line 26, referring to Fig. 5)* A computer program product for use in a system for recognizing a pattern in information comprising data, said computer program product comprising:

a computer readable medium having stored thereon program code means, said program code means comprising:

means for receiving data, and to encode said received data as parameters of a plurality of Fourier series in Fourier space, said plurality of Fourier series including input context of said data;

(input layer 12)

means for associating Fourier series together to form a string;

(association layer 14)

means for ordering said string based on a relative degree of association of order formatted subsets of said string with relevant aspects of information of a standard string to form an ordered string; and

(string ordering layer 16)

means for forming a complex ordered string from a plurality of ordered strings, said complex ordered string representing a historical association and order of processed and stored information to thereby allow recognition of a pattern in information.

(predominant configuration layer 18)

305. *(page 1, line 29 to page 4, line 30; page 21, line 9 to page 23, line 26)* A computer program according to claim 304, further comprising storing said complex ordered string in high level memory.

306. *(page 1, line 29 to page 4, line 30; page 21, line 9 to page 23, line 26)* A computer program product according to claim 305, wherein said means for associating is operable to associate ones of said plurality of Fourier series based on a spectral similarity between one another.

307. *(page 6, line 25 to page 23, line 26)* A data structure in a memory for access by a computer program for processing information, said data structure allowing an efficient recognition of a pattern in newly presented information comprising data and input context representing characteristic in relational association with information stored in said memory, said data structure comprising:

a plurality of transduced data objects, each of said plurality of transduced data objects providing an input data object representative of characteristics received from a transducer acting on a signal provided by the characteristics encoded as a Fourier series in Fourier space;

(input layer 12)

wherein a value of each of said plurality of activation probability objects being determined based on historical values and frequency of activation of said respective one of said plurality of transduced data objects, input data objects, memory data objects, said plurality of association data objects and said plurality of order formatted data objects to thereby allow recognition of characteristics of said newly presented information based on historical relational and associational pattern in said information stored in said memory.

308. *(page 6, line 25 to page 7, line 10)* A data structure according to claim 307, wherein the transduced data objects correspond to the input data objects which further correspond to the memory data objects such that context of the characteristics is encoded.

309. *(page 6, line 25 to page 7, line 10; page 8, line 19 to page 16, line 15; page 21, line 9 to page 23, line 26)* A data structure according to claim 308, wherein the organization of the memory data objects of memory corresponds to and represents the context of the input data objects which further corresponds to and represents the transduced data objects which further corresponds to and represents the context of the characteristics.

310. *(page 9, lines 4-25; page 22, line 34 to page 23, line 26)* A data structure according to claim 307, wherein the transducer has n levels of subcomponents and is assigned a master memory register with n + 1 sub registers in a heirarchical manner that parallels and corresponds to the n levels of the transducer subcomponents wherein the stream of transduced data objects from the n th level transducer sub component provides said plurality of input data objects that are stored as memory data objects as a function of time in the n+1 sub register wherein the identity of the memory register encodes the input context which represents the context of the

characteristics according to the specific transducer or transducer subcomponent.

311. *(page 9, lines 4-25; page 22, line 34 to page 23, line 26)* A data structure according to claim 307, wherein the transducer has n levels of subcomponents and is assigned a master memory pointer with n + 1 sub pointers in a heirarchical manner that parallels and corresponds to the n levels of the transducer subcomponents wherein the stream of transduced data objects from the n th level transducer sub component provides said plurality of input data objects that are stored as memory data objects as a function of time in the n+1 sub pointer wherein the identity of the memory pointer encodes the input context which represents the context of the characteristics according to the specific transducer or transducer subcomponent.

312. *(page 1, line 32 to page 2, line 14; page 21, line 9 to page 23, line 26)* A data structure according to claim 307, further comprising a predominant configuration data object being a sum of associated ones of said plurality of order formatted data objects.

313. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15; page 22, line 34 to page 23, line 26)* A data structure in a memory for access by a computer program for efficient recognition of a pattern in information comprising data stored in the memory, the data structure comprising:

a plurality of transduced data objects, each of said plurality of transduced data objects providing an input data object representative of characteristics received from a respective one of a plurality of transducers acting on a signal provided by characteristics encoded as a Fourier series in Fourier space, wherein said input data objects allows associations among and relational pattern of said input data objects by spectral analysis to achieve recognition of a

pattern in information, while preserving input context of said input signal including an identity of said respective one of said plurality of transducers.
(input layer 12, Fourier transform processor 22, spectral similarity analyzer 36).

314. *(page 2, lines 15-33; page 8, line 19 to page 16, line 15; page 22, line 34 to page 23, line 26)* A data structure according to claim 313, further comprising a plurality of association data objects, each of said plurality of association data objects being a sum of associated ones of said plurality of input data objects.

315. *(page 16, line 16 to page 23, line 26)* A data structure according to claim 314, further comprising a plurality of order formatted data objects, each of said plurality of order formatted data objects being one of said plurality of association data objects arranged in a hierarchically order of relative degree of association with relevant characteristics of said information with respect to a standard plurality of order formatted data objects.

316. *(page 22, line 8 to page 23, line 26)* A data structure according to claim 313, further comprising a predominant configuration data object being a sum of associated ones of said plurality of order formatted data objects.

317. *(page 22, line 8 to page 23, line 26)* A data structure according to claim 316, further comprising a plurality of activation probability objects, each of said plurality of activation probability objects being assigned to respective said plurality of transduced objects, said plurality of memory data objects, said plurality of input data objects, said plurality of association data objects, said plurality of order formatted data objects and said predominant configuration data object.

318. *(page 22, line 8 to page 23, line 26)* A data structure according to claim 314, further comprising a plurality of activation probability operands based on activation probability parameters, each of said plurality of activation probability operands being assigned to respective said plurality of transduced objects, said plurality of memory data objects, said plurality of input data objects, said plurality of association data objects, said plurality of order formatted data objects and said predominant configuration data object.

319. *(page 22, line 8 to page 23, line 26)* A data structure according to claim 318, wherein said activation probability parameter of each object is based on at least one of historical activation probability parameter or an activation frequency.

320. *(page 22, line 8 to page 23, line 26)* A data structure according to claim 318, wherein an object is activated when said probability operand has a desired value.

321. *(page 22, line 8 to page 23, line 26)* A data structure according to claim 320, wherein said probability operand has a value selected from the set of one and zero.

322. *(page 22, line 8 to page 23, line 26)* A data structure according to claim 321, wherein said desired value is one.